

Reflecting figures in coordinate space

In this lesson we'll look at how the reflection of a figure in a coordinate plane determines where it's located.

A **reflection** is a type of transformation that flips a figure over a line. The line is called the **line of reflection**, or the mirror line. The line of reflection can be horizontal, vertical, or diagonal.

Pre-image/image

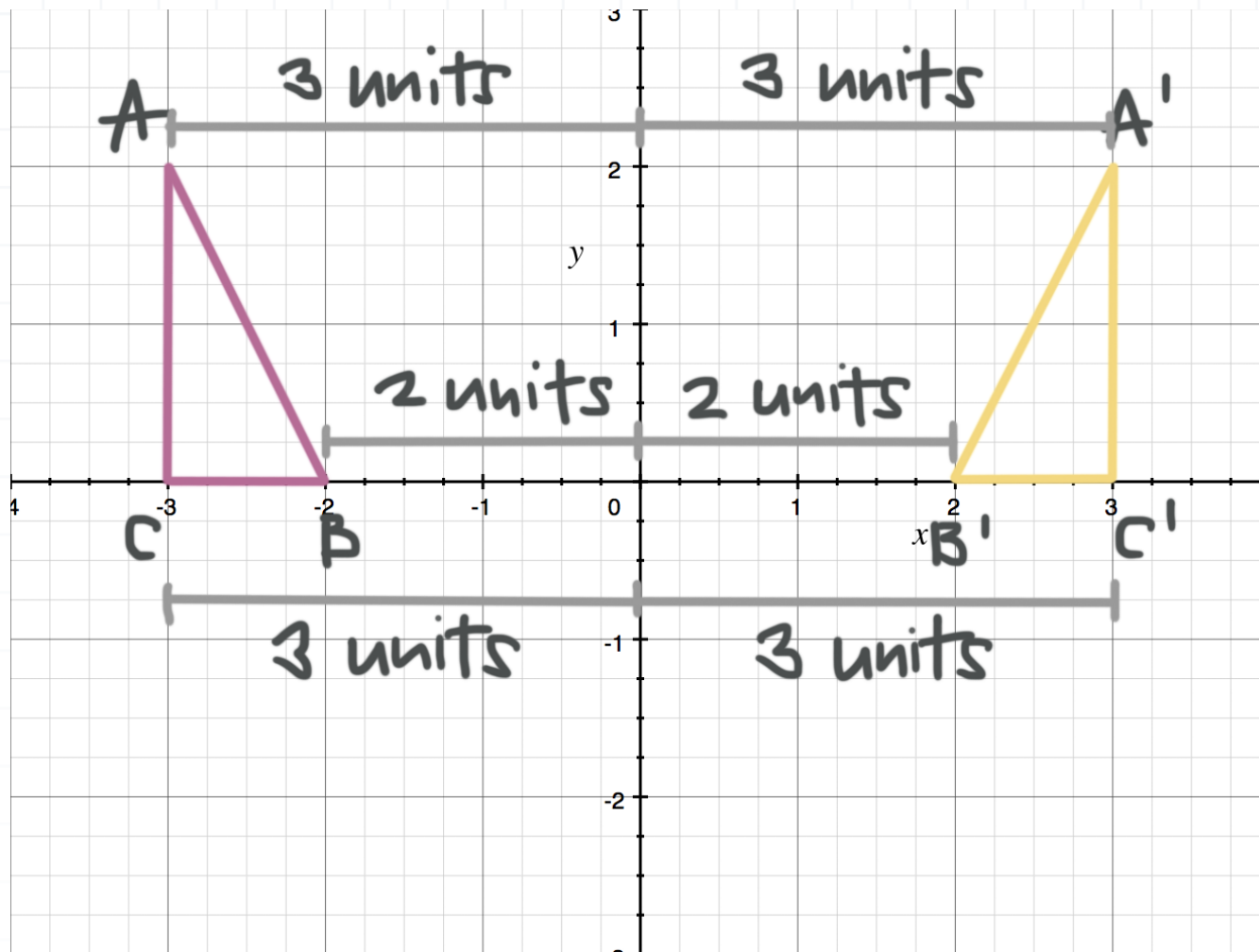
A transformation of a shape always starts with the **pre-image**. The pre-image is usually labeled with capital letters. After the pre-image is reflected, the final version of the figure is called the **image**, which is usually labeled with the same capital letters, plus the prime symbol, '. So if figure $ABCD$ is reflected, its image becomes figure $A'B'C'D'$.

The image and pre-image are always congruent to each other, because the reflection never changes the angles measures or side lengths of the figure.

Reflecting figures

To reflect a figure over a line, the points are the same distance from the line of reflection. Each point from the pre-image is the same distance from the y -axis as its matching point in the image.





Notice when we reflect over the y -axis, so the x -values are changing their sign.

$$A = (-3, 2)$$

$$A' = (3, 2)$$

$$B = (-2, 0)$$

→

$$B' = (2, 0)$$

$$C = (-3, 0)$$

$$C' = (3, 0)$$

Here are some commonly used reflections and their rules.

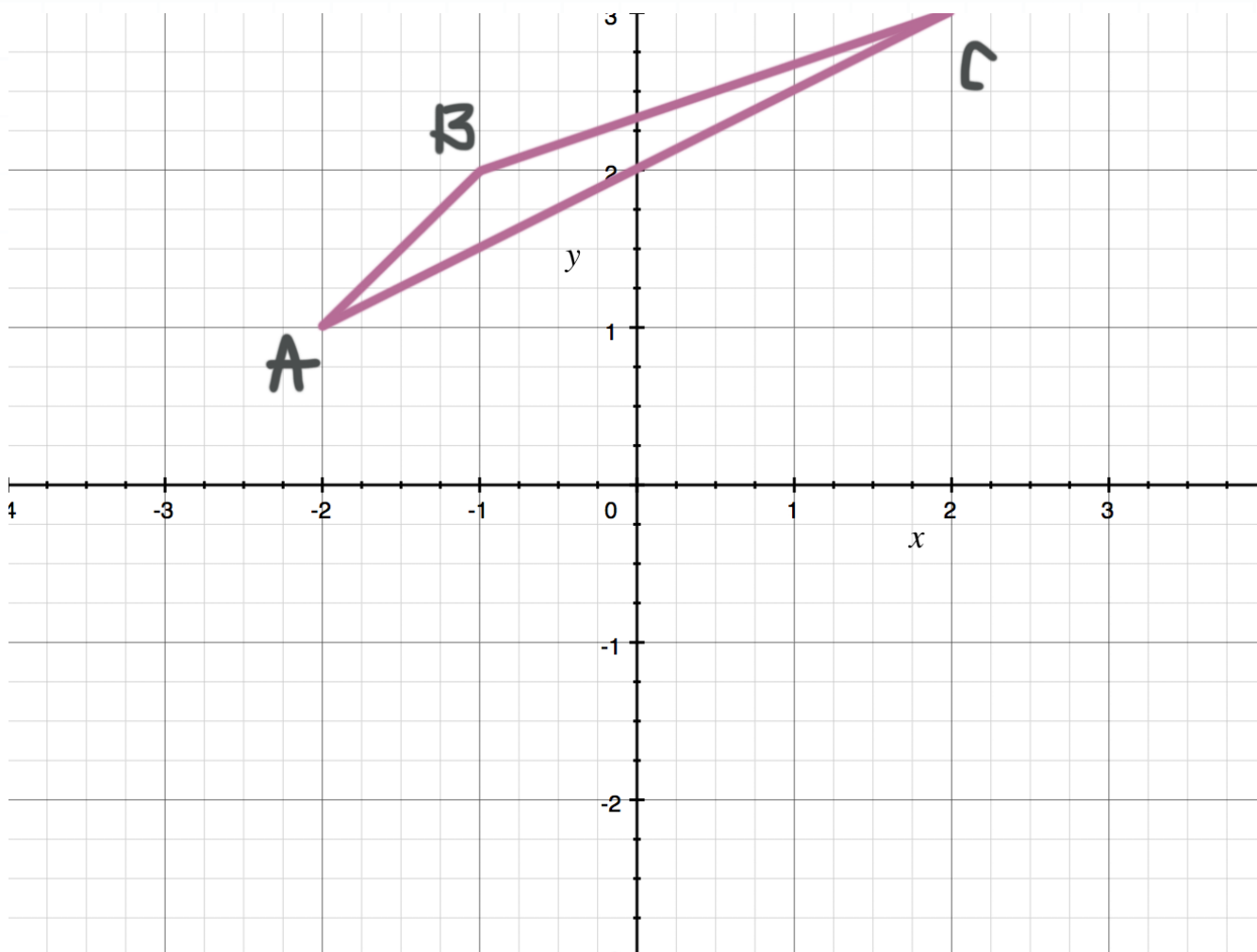


Line of reflection	Rule
y-axis	(x,y) to $(-x,y)$ This means the x-values will change signs.
x-axis	(x,y) to $(x,-y)$ This means the y-values will change signs.
$y=x$	(x,y) to (y,x) The x- and y-coordinates will change places.

Let's look at some examples.

Example

Draw $\triangle ABC$ after it's been reflected across the x -axis.



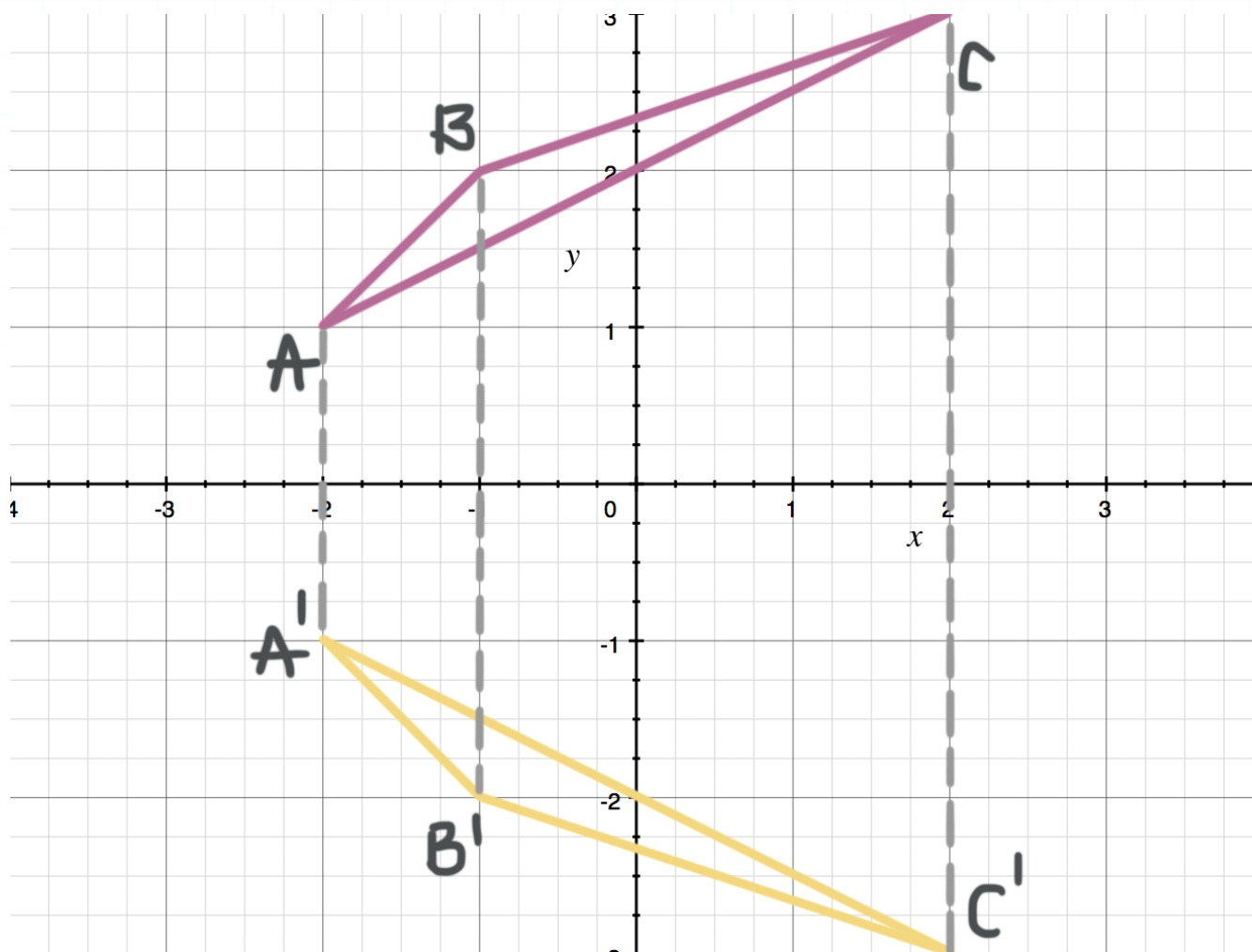
Let's look at one vertex of the triangle at a time.

Point A is 1 unit above the x -axis, so A' will be 1 unit below the x -axis.

Point B is 2 units above the x -axis, so B' will be 2 units below the x -axis.

Point C is 3 units above the x -axis, so C' will be 3 units below the x -axis.

This means when you reflect across the x -axis, the y -coordinates will change signs.

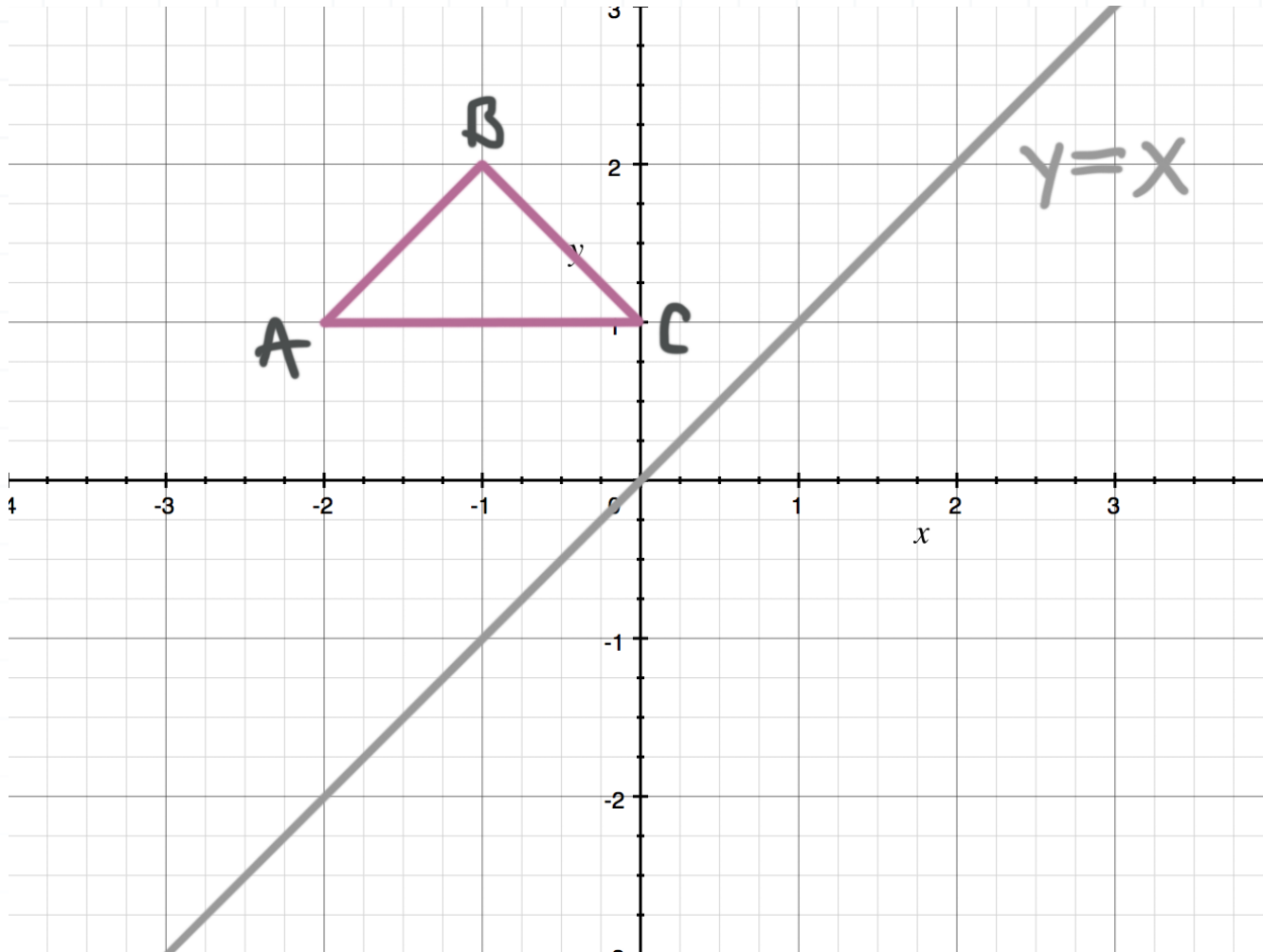


Let's look another example.



Example

Reflect triangle ABC across the line $y = x$.



When you reflect across the line $y = x$, the x - and y -values switch places. Let's write down the coordinates of the triangle.

$$A = (-2, 1)$$

$$B = (-1, 2)$$

$$C = (0, 1)$$

Now to reflect the triangle over the line, let's switch the x - and y -values in each coordinate point.



$$A = (-2, 1)$$

$$A' = (1, 2)$$

$$B = (-1, 2)$$

→

$$B' = (2, -1)$$

$$C = (0, 1)$$

$$C' = (1, 0)$$

Then you can plot the image.

